Space Weather Forecast

Issued on Saturday, 14 September 2024 at 00:03 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2 Minor to Moderate storms with CME arrival expected on Day 1 (14 Sep) and perhaps Day 3 (16 Sep). Moderate to High Solar Activity expected. Chance of visible aurora for northern parts of the UK.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: High activity was observed, with the strongest Moderate flare from a sunspot region that is now over the southwest limb. This was also the likely source of an extended period where the background X-ray observation rose above the Moderate flare level, lasting 12/2140-13/0936 UTC, with a relatively wide and bright coronal mass ejection (CME) also observed from the west limb. Other frequent Moderate level flares were also observed. The other region of interest is a newly numbered region that recently rotated onto the southeast limb. While modestly sized, this region is magnetically complex and has been the source of the most recent Moderate flares as well as the Strong flare that was observed on 12 Sep.

A filament eruption, most likely associated with a Moderate flare originating from an active region in the northwest quadrant, was observed on satellite imagery at around 13/0930 UTC. While the bulk of the ejecta is expected to pass ahead of Earth's orbit towards the spacecraft Stereo-A, it may still be able to give a glancing blow on the 16th (Day 3). Other and often large CMEs were observed but these are not deemed to be Earth-directed.

Solar Wind / Geomagnetic Activity: Solar wind parameters are indicative of the waning influence of the Coronal Mass Ejection (CME) that arrived at Earth on 12 Sep. Solar wind speeds were quite erratic but reduced from 500 to 450 km/s. The Interplanetary Magnetic Field (IMF) Bt, was Weak to Moderate, but the important north-south component, Bz, remained largely negative, reaching -9nT between 13/1930-2130 UTC. The net result of these parameters was for Unsettled to Active geomagnetic activity, with two G2 Moderate storm intervals between 13/0000-0300 UTC and 13/2100-2400 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was steady at near background.

Four-Day Space Weather Forecast Summary

Solar Activity: High to moderate activity expected with Moderate class flares expected and a chance of further Strong (X-class) flares, although this risk decreasing later in the period as the southwest regions rotate further onto the far-side.

Solar Wind / Geomagnetic Activity: Solar winds are still slightly elevated after the recent CME arrival on 12 Sep. There are two further CME arrivals in the forecast - first one on Day 1 (14 Sep) and the second one on Day 3 (16 Sep) - plus the potential onset of the high speed stream of CH68 and CH69 on Days 2 & 3 (15 & 16 Sep). Geomagnetic activity is expected to be Active to G1/G2 Minor/Moderate Storms on Day 1 (14 Sep) with a slight chance of isolated G3 Strong

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storms possible. Mostly Quiet to Unsettled by Day 2 (15 Sep) but Unsettled to Active on Day 3 (16 Sep) with isolated G1 Minor Storm possible. Down to Quiet and Unsettled by Day 4 (17 Sep).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) has a chance to rise, mainly given any further strong flares and eruption from the southwest disc. This brings a chance of exceeding the S1 Minor Radiation Storm level, although this risk recedes later in the period as these regions move further onto the farside.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	70	5	30	5
Strong	G3	No	30	1	5	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	70	70
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	15	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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